

# LA-UR-12-25244

Approved for public release; distribution is unlimited.

Title: Science Campaign-1 Pulsed Power Efforts

Author(s): Rousculp, Christopher L.  
Reass, William A.  
Oro, David M.  
Griego, Jeffrey R.  
Turchi, Peter J.  
Hollander, Brian J.  
Reinovsky, Robert E.

Intended for: Briefing of NNSA-HQ at LANL Visit



## Disclaimer:

Los Alamos National Laboratory, an affirmative action/equal opportunity employer, is operated by the Los Alamos National Security, LLC for the National Nuclear Security Administration of the U.S. Department of Energy under contract DE-AC52-06NA25396. By approving this article, the publisher recognizes that the U.S. Government retains nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or to allow others to do so, for U.S. Government purposes. Los Alamos National Laboratory requests that the publisher identify this article as work performed under the auspices of the U.S. Department of Energy. Los Alamos National Laboratory strongly supports academic freedom and a researcher's right to publish; as an institution, however, the Laboratory does not endorse the viewpoint of a publication or guarantee its technical correctness.



# Science Campaign-1 Pulsed Power Efforts

---

**C. L. Rousculp (XCP-6), W. A. Reass (AOT-RFE), D. M. Oro (P-22), J. R. Griego (P-24), P. J. Turchi (P-DO), B. J. Hollander (P-25), R. E. Reinovsky (XTD-3)**

**4 Oct 2012**



# Abstract

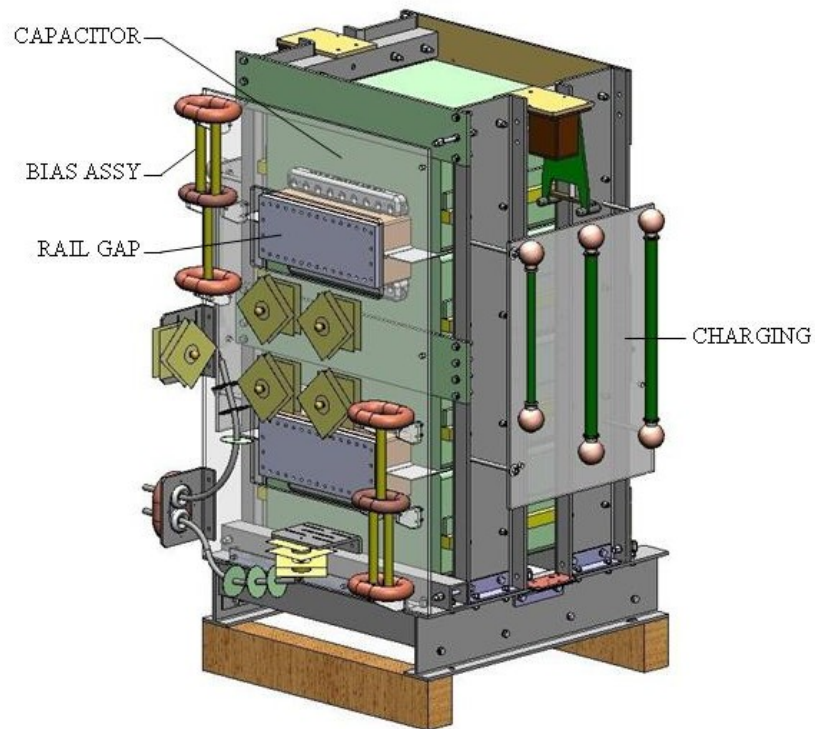
---

The PHELIX portable pulsed-power driver is discussed. It is composed of two air-insulated, single Marx modules capable of storing 300 kJ of electrical energy. The Marx are cable coupled to a toroidal transformer with a 4:1 winding ratio. The experimental load is located at the center of the transformer. The components are mounted in a 8'x10'x18' boxcar which can be moved in and out of the beam line at the LANL proton radiography facility and prevents EMI within the facility. PHELIX has successfully completed two liner implosion experiments with full diagnostic return from flash X-ray imaging, optical Faraday load current, and multi-channel PDV. Computational modeling with both the legacy 1D MHD code RAVEN and the LANL ASC-LAP FLAG code show good agreement with data.

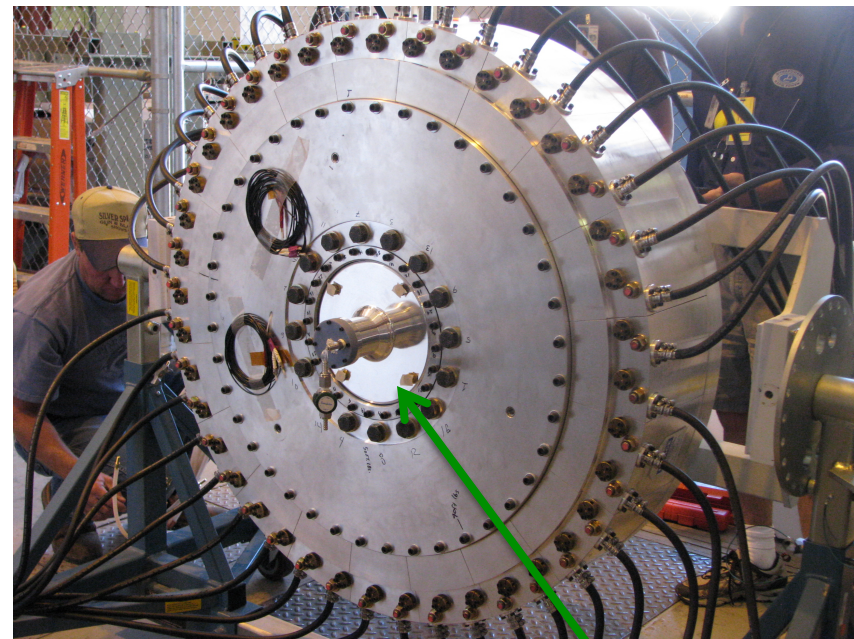


# PHELIX Technology

**Two Air-Insulated  
120 kV  
Marx Modules (300 kJ)**



**Toroidal Transformer  
40 Cables (4:1 Winding)**

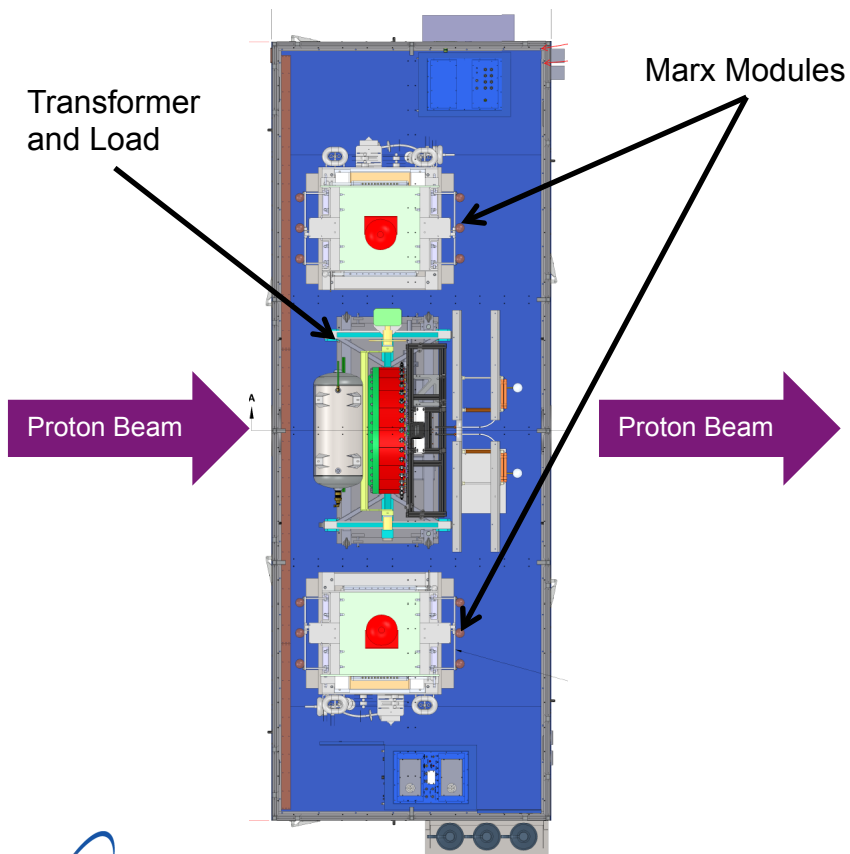


**Experimental Load**



# PHELIX Boxcar Prevents EMI at pRad

Top View



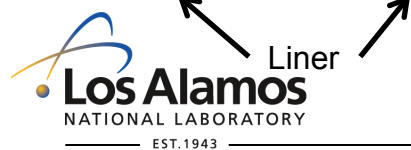
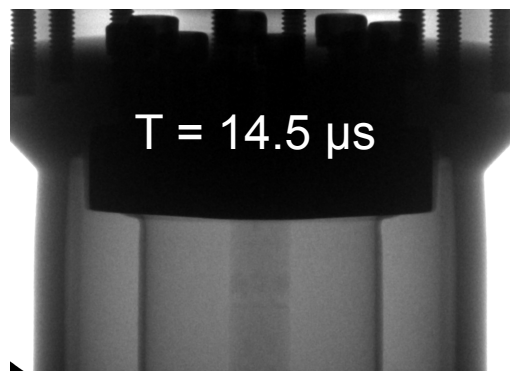
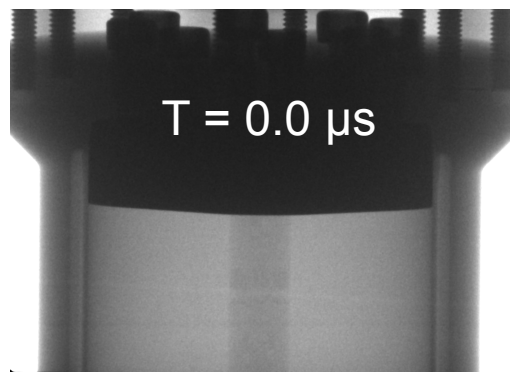
PHELIX at LANL Proton Radiography Facility





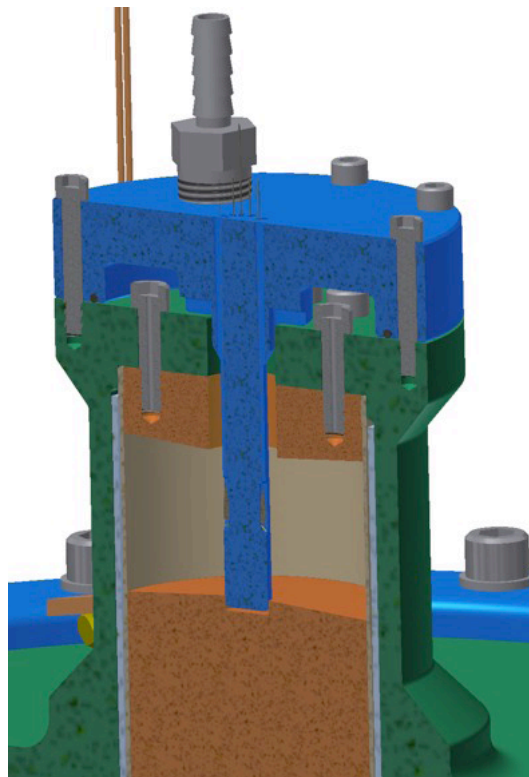
# PHELIX Liner Demonstration (PLD-1) Showed High Uniformity and Symmetry

## Single Frame Flash X-Radiography

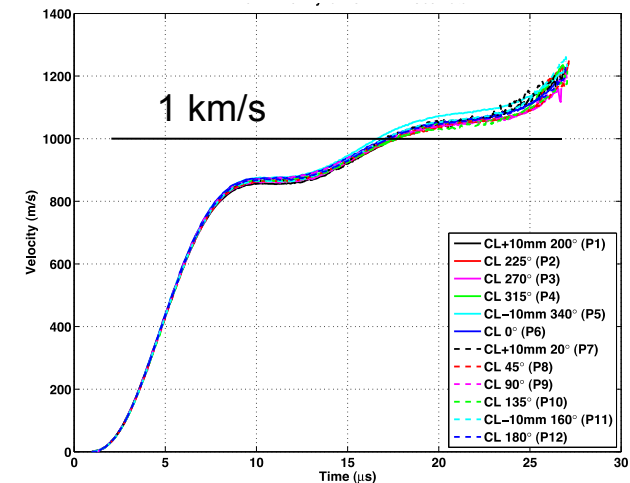


Operated by Los Alamos National Security, LLC for NNSA

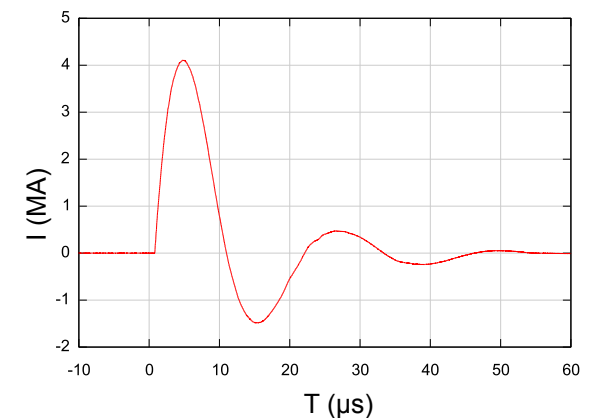
## PLD-1 Load



## 12 Channel PDV



## Load Current



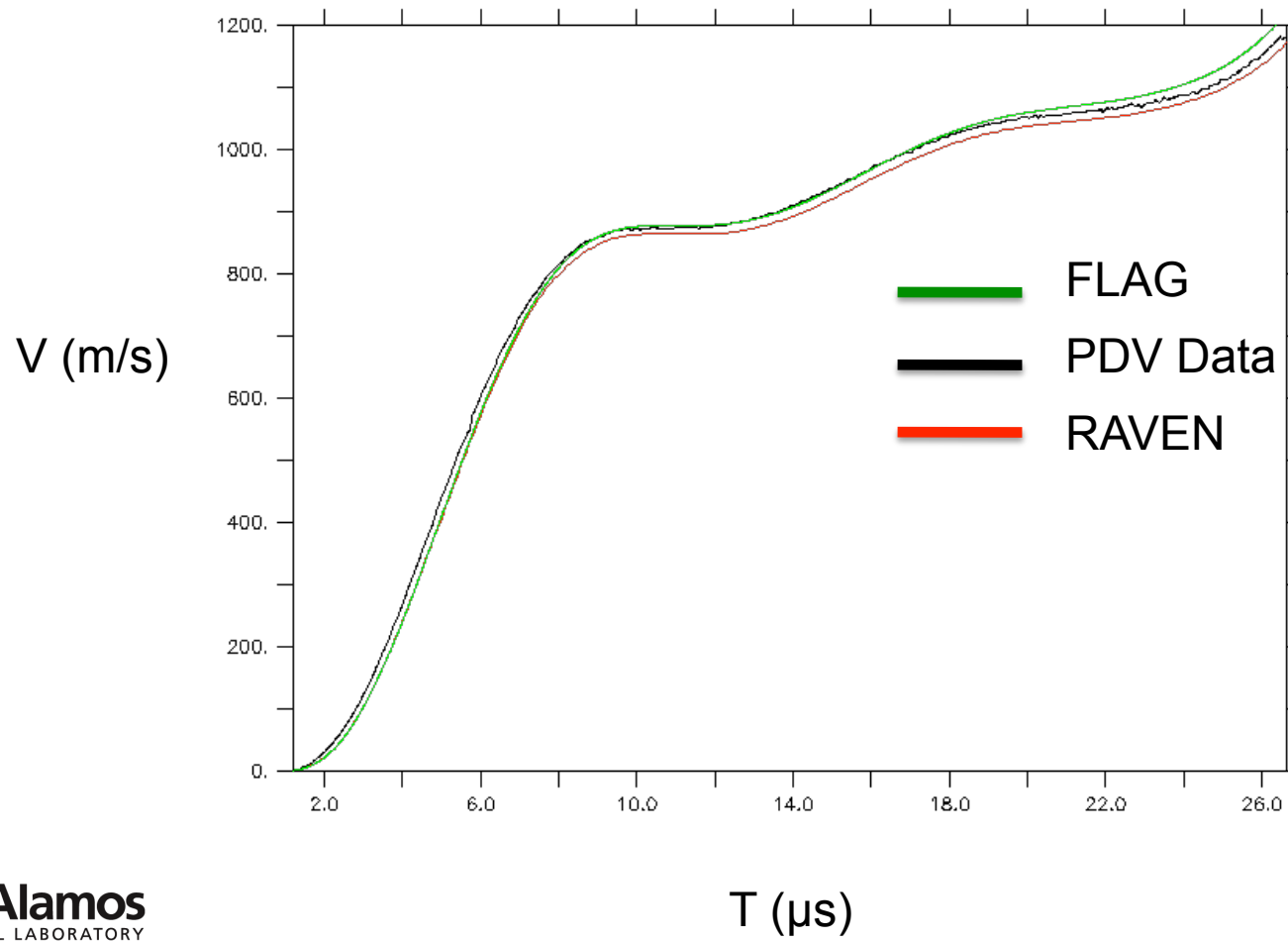
UNCLASSIFIED





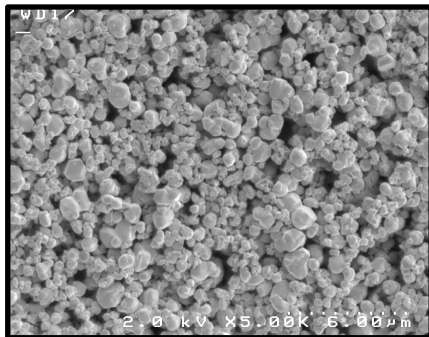
# 1-D MHD Modeling of PLD-1

Liner Inner Surface Velocity

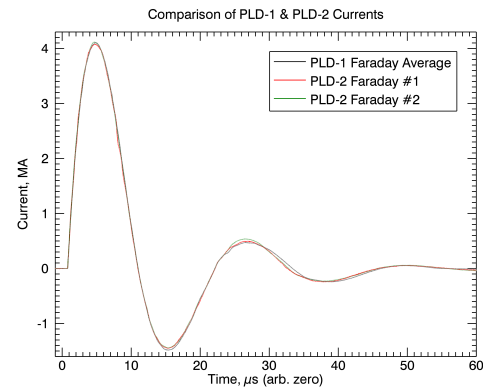




# PLD-2 - Shock Release of Tungsten Powder from Target

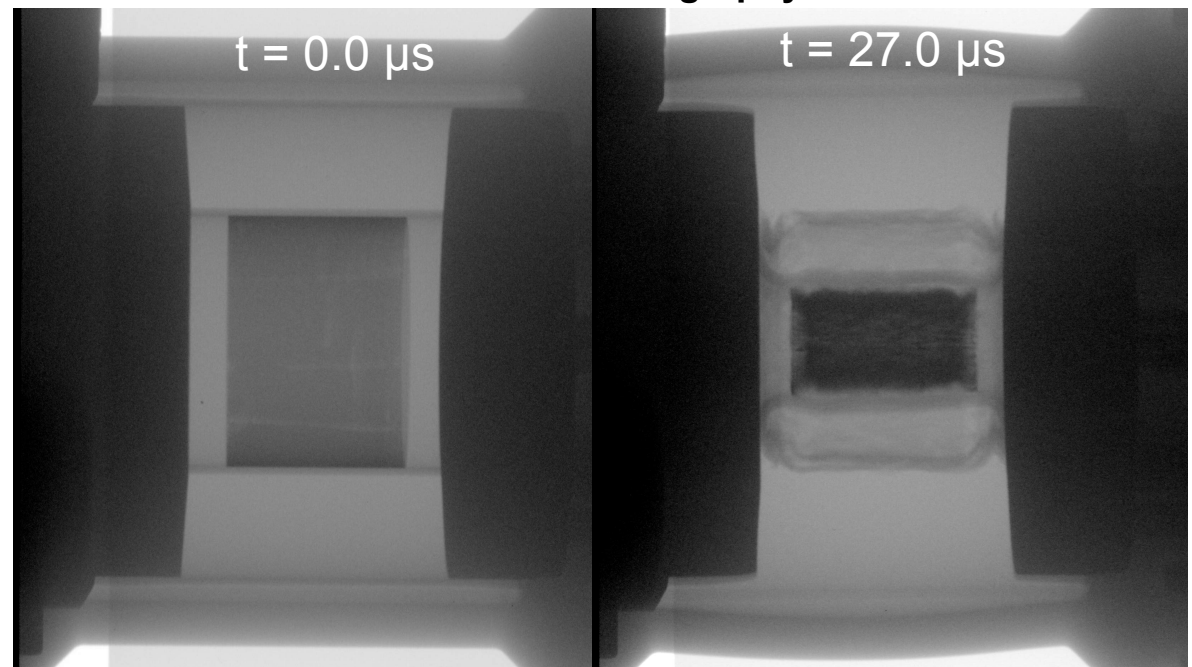


SEM  
Tungsten  
Powder



Optical  
Faraday  
Rotation

Flash X-Radiography



Liner  
on  
Target  
Load



Operated by Los Alamos National Security, LLC for NNSA

UNCLASSIFIED





Time = 15.000

PHELIX PLD-pRAD

1 cm

